TEJUS
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No. TC / BBMP / YNK-PMC / 062 / 16 – 17

To
The Executive Engineer
Yelahanka Zone, Project Division
Bruhat Bangalore Mahanagara Palike

Date:

Dear Sir

Sub: **Second and Final bill for the work of Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB water tank side in ward No.04**

In reference to the above subject, this is to bring to your kind notice that we have scrutinized the **Second and Final bill** submitted by Sri. Uday Shetty, towards the above said work and arrived at an amount of **Rs. 5285394.28** (Rupees Fifty **Two Lakh Eighty Five Thousand Three Hundred Ninety Four and Paise Twenty Eight Only**). The work has been completed satisfactorily.

This is for your kind information.

Thank you and assuring you the best of our Services at all the times

For Tejus Consultants
Authorised Sig

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No. TC / BBMP / YNK-PMC / 062 / 16 – 17

To
The Executive Engineer
Yelahanka Zone, Project Division
Bruhat Bangalore Mahanagara Palike

Date:

Dear Sir

Sub: **Second and Final bill for the work of Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB water tank side in ward No.04**

In reference to the above subject, this is to bring to your kind notice that we have scrutinized the **Second and Final bill** submitted by Sri. Uday Shetty, towards the above said work and arrived at an amount of **Rs. 5285394.28 (Rupees Fifty Two Lakh Eighty Five Thousand Three Hundred Ninety Four and Paise Twenty Eight Only)**. The work has been completed satisfactorily.

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Thank you and assuring you the best of our Services at all the times

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For Tejus Consultants
(Nameeth N)

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Name of Work	:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	:	M/s Tejus Consultants
Contractor	:	Sri.Uday shetty
Date of Testing	:	23/11/2016
Type of Mix	:	WMM
Sample I/D	:	WMM1

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	At plant	Date of Sampling:	23/11/2016
		Date of testing:	23/11/2016
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	265	265	2.65	97.35	95-100
22.4	2760	3025	30.25	69.75	60-80
11.2	2415	5440	54.40	45.60	40-60
4.75	995	6435	64.35	35.65	25-40
2.36	1100	7535	75.35	24.65	15-30
0.6	572	8107	81.07	18.93	8.0-22.0
0.075	1452	9559	95.59	4.41	0-8
Pan	441				
Total	10000				

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Project	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	M/s Tejus Consultants
Contractor	Sri.Uday shetty

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28))

Location:					Date:	24/11/2016
Layer no. or level	WMM I layer					
Depth of hole						
Field density:	1	2				
Wt. of wet material from hole (Ww) gms.	6594	6645				
Wt. of sand+cylinder before pouring (w1) gms.	14000	14000				
Wt. of sand+cylinder after pouring (w2) gms.	9531	9412				
Wt. of sand in cone (w3) gms.	865	865				
Wt. of sand in hole (w4)=(w1-w2-w3) gms.	3604	3723				
Bulk density of sand (γs)gm/cc	1.32	1.32				
Bulk density of material(i.e. wt. of the wet material) (γb=(Ww/w4"(γs))gm/cc	2.42	2.36				
Moisture meter reading(moisture content)	7.00	5.00				
Result						
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.26	2.24				
MDD	2.30	2.30				
OMC	6.30%	6.30%				
% compaction obtained	98.14	97.56				
% compaction required	98%	98%				

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Project	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	M/s Tejus Consultants
Contractor	Sri.Uday shetty

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28))

Location:					Date:	24/11/2016
Representing chainage	300-450					
Layer no. or level	WMM I layer					
Depth of hole						
Field density:	1	2				
Wt. of wet material from hole (Ww) gms.	6025	6122				
Wt. of sand+cylinder before pouring (w1) gms.	14000	14000				
Wt. of sand+cylinder after pouring (w2) gms.	9825	9794				
Wt. of sand in cone (w3) gms.	865	865				
Wt. of sand in hole (w4)=(w1-w2-w3) gms.	3310	3341				
Bulk density of sand (γs)gm/cc	1.32	1.32				
Bulk density of material(i.e. wt. of the wet material) γb=[(Ww/w4*(γs))]gm/cc	2.40	2.42				
Moisture meter reading(moisture content)	6.00	7.00				
Result:						
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.27	2.26				
MDD	2.30	2.30				
OMC	6.30%	6.30%				
% compaction obtained	98.55	98.28				
% compaction required	98%	98%				

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Name of Work	:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	:	M/s Tejus Consultants
Contractor	:	Sri.Uday shetty
Date of Testing	:	28/11/2016
Type of Mix	:	WMM
Sample I/D	:	WMM2

GRADATION FOR WMM
(As per MORT&H 400-11)

Sample Location:	At plant	Date of Sampling:	28/11/2016
		Date of testing:	28/11/2016
Type of material & Purpose:	WMM	Oven Dry Wt.(gms):	10000.0

Sl.No Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
53	0	0	0.00	100.00	100.00
45	264	264	2.64	97.36	95-100
22.4	2991	3255	32.55	67.45	60-80
11.2	2564	5819	58.19	41.81	40-60
4.75	964.0	6783	67.83	32.17	25-40
2.36	1102.0	7885	78.85	21.15	15-30
0.6	561.0	8446	84.46	15.54	8.0-22.0
0.075	1210.0	9656	96.56	3.44	0-8
Pan	344.0				
Total	10000.0				

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Project:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant:	M/s Tejus Consultants
Contractor:	Sri.Uday shetty

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28))

Location:					Date:	29/11/2016
Layer no. or level	WMM II layer					
Depth of hole						
Field density:	1	2				
Wt. of wet material from hole (Ww) gms.	5208	5264				
Wt. of sand+cylinder before pouring (w1) gms.	14000	14000				
Wt. of sand+cylinder after pouring (w2) gms.	10210	10201				
Wt. of sand in cone (w3) gms.	865	865				
Wt. of sand in hole (w4)=(w1-w2-w3) gms.	2925	2934				
Bulk density of sand (γs)gm/cc	1.32	1.32				
Bulk density of material(i.e. wt. of the wet material) (γb=(Ww/w4*(γs))gm/cc	2.35	2.37				
Moisture meter reading(moisture content)	6.00	6.00				
Result:						
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.22	2.23				
MDD	2.30	2.30				
OMC	6.30%	6.30%				
% compaction obtained	96.40	97.14				
% compaction required	98%	98%				

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Project:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant:	M/s Tejus Consultants
Contractor:	Sri.Uday shetty

Field Dry Density test by Sand Replacement Method (As per IS 2720 (Part 28))

Location: Date: 29/12/2016

Layer no. or level: WMM II layer

Depth of hole:

Field density:	1	2				
Wt. of wet material from hole (Ww) gms.	5214	5341				
Wt. of sand+cylinder before pouring (w1) gms.	14000	14000				
Wt. of sand+cylinder after pouring (w2) gms.	10250	10165				
Wt. of sand in cone (w3) gms.	865	865				
Wt. of sand in hole (w4)=(w1-w2-w3) gms.	2885	2970				
Bulk density of sand (γs)gm/cc	1.32	1.32				
Bulk density of material(i.e. wt. of the wet material) (γb)=(Ww/w4*(γs))gm/cc	2.39	2.37				
Moisture meter reading(moisture content)	6.00	6.00				
Result:						
FDD(Wt.of the dry material)=(100γb/100+mc)gm/cc	2.25	2.24				
MDD	2.30	2.30				
OMC	6.30%	6.30%				
% compaction obtained	97.85	97.37				
% compaction required	98%	98%				

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Project:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant:	M/s Tejus Consultants
Contractor:	Sri.Uday shetty

AGGREGATE IMPACT VALUE
(IS: 2386 Part - 4)

Material Use:	DBM	Date of Sampling		06/12/16
Sample Location:	At plant	Date of Testing		06/12/16

Sl.No.	Description		Test No. 1	Test No. 2	Test No. 3	Spec Limit (%)
1	Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm)	(Wa)	344.00	351.00	371.00	
2	Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm)	(Wb)	268.00	261.00	271.00	
3	Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm)	(Wc)	76.00	90.00	100.00	
4	Aggregate Impact Value (%)	(Wc/Wa)*100	22.09	25.64	26.95	
5	Average Aggregate impact value	(%)	24.90			Max - 30 %

Remarks: Satisfactory / Not Satisfactory

Contractor's Representative | Department Engineer (AE/JE) | Consultant's Representative

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Project:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant:	M/s Tejus Consultants
Contractor:	Sri.Uday shetty

AGGREGATE IMPACT VALUE
(IS: 2386 Part - 4)

Material Use:	DBM	Date of Sampling		06/12/16
Source/Location:	At plant	Date of Testing		06/12/16

Sl.No.	Description		Test No. 1	Test No. 2	Test No. 3	Spec Limit (%)
1	Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm)	(Wa)	318.00	321.00	326.00	
2	Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm)	(Wb)	243.00	252.00	246.00	
3	Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm)	(Wc)	75.00	69.00	80.00	
4	Aggregate Impact Value (%)	(Wc/Wa)*100	23.58	21.50	24.54	
5	Average Aggregate impact value	(%)	23.21			Max - 30 %

Satisfactory / Not Satisfactory

Department Engineer (AE/JE)

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Consultant's Representative

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Work:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant:	M/s Tejus Consultants
Contractor:	Sri.Uday shetty

AGGREGATE IMPACT VALUE
(IS: 2386 Part - 4)

Material Use:	DBM	Date of Sampling		06/12/16
Material Location:	At plant	Date of Testing		06/12/16

Sl.No.	Description		Test No. 1	Test No. 2	Test No. 3	Spec Limit (%)
a	Wt. of stone pieces (dry) passing IS Sieve 12.5mm but retained in IS sieve 10mm (gm)	(Wa)	321.00	333.00	324.00	
b	Wt. of the fraction retained in IS sieve 2.36mm after the impact test (gm)	(Wb)	251.00	254.00	261.00	
c	Wt. of the fraction passed in IS sieve 2.36mm after the impact test (gm)	(Wc)	70.00	79.00	63.00	
d	Aggregate Impact Value (%)	(Wc/Wa)*100	21.81	23.72	19.44	
e	Average Aggregate impact value	(%)	21.66			Max - 30 %

Satisfactory / Not Satisfactory

Contractor's Representative | Department Engineer (AE/JE) | Consultant's Representative

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Project	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	M/s Tejus Consultants
Contractor	Sri.Uday shetty

FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

Type of Material	DBM	Proposed Use	DBM
Sample Location	At plant	Date of Sampling	06/12/16
Source of Material		Date of Testing	06/12/16

Size of aggregate		Flakiness Index		Elongation Index	
Passing through IS sieve, mm	Retained on IS sieve, mm	Total wt. of aggregate retained on sieves (A) gms.	Wt. of aggregate passing from Flakiness gauge (B) gms	Wt. of aggregate retained on Flakiness gauge (C) gms	Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	8751	973	7778	512
31.5	25.0	4651	801	3850	431
25.0	20.0	2651	451	2200	274
20.0	16.0	1201	314	887	254
16.0	12.5	518	124	394	94
12.5	10.0	245	74	171	48
10.0	6.3	105	54	51	31
Total		**18122**	**2791**	**15331**	**1644**

Remarks

Flakiness Index(%):	15.40
Elongation Index(%):	10.72
Combined FI+EL (%)	26.12

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Project:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant:	M/s Tejus Consultants
Contractor:	Sri.Uday shetty

FLAKINESS AND ELONGATION INDICES (IS 2386, PART 1)

Type of Material	DBM	Proposed Use	DBM
Sample Location	At plant	Date of Sampling	06/12/16
Source of Material		Date of Testing	06/12/16

Size of aggregate		Flakiness Index		Elongation Index	
Passing through IS sieve, mm	Retained on IS sieve, mm	Total wt. of aggregate retained on sieves (A) gms.	Wt. of aggregate passing from Flakiness gauge (B) gms	Wt. of aggregate retained on Flakiness gauge (C) gms	Wt. of aggregate retained on Elongation gauge after retained on Flakiness gauge(D)gms
63.0	50.0	0	0	0	0
50.0	40.0	0	0	0	0
40.0	31.5	7540	857	6683	524
31.5	25.0	4512	750	3762	353
25.0	20.0	2716	540	2176	235
20.0	16.0	2354	402	1952	210
16.0	12.5	610	215	395	142
12.5	10.0	251	96	155	33
10.0	6.3	90	55	35	25
Total		**18073**	**2915**	**15158**	**1522**

Remarks:

Flakiness Index(%):	16.13
Elongation Index(%):	10.04
Combined FI+EL (%)	26.17

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Name of Work	:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	:	M/s Tejus Consultants
Contractor	:	Sri.Uday shetty
Date of Testing	:	06/12/16
Type of Mix	:	DBM
Sample ID	:	1

GRADATION FOR DBM
(As per MORT&H 500-10,Grading-2)

Sample Location: At plant — Date of Sampling:

Date of testing:

Type of material & Promise: DBM — Oven Dry Wt.(gms): 1350.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
37.50	0	0	0.00	100.00	100.00
26.50	63	63	4.67	95.33	90-100
19.00	155	218	16.15	83.85	71-95
13.20	119	337	24.96	75.04	56-80
4.750	363	700	51.85	48.15	38-54
2.360	181	881	65.26	34.74	28-42
0.300	325	1206	89.33	10.67	7-21
0.075	116	1322	97.93	2.07	2-8
Pan	28				
Total	1350.0				

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Name of Work	:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	:	M/s Tejus Consultants
Contractor	:	Sri.Uday shetty
Date of Testing	:	06/12/16
Type of Mix	:	DBM
Sample ID	:	2

GRADATION FOR DBM
(As per MORT&H 500-10,Grading-2)

Sample Location: At plant

Date of Sampling: 30/08/16

Date of testing: 30/08/16

Type of material & Purpose: DBM

Oven Dry Wt.(gms): 1150.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
37.50	0	0	0.00	100.00	100.00
26.50	46	46	4.00	96.00	90-100
19.00	96	142	12.35	87.65	71-95
13.20	104	246	21.39	78.61	56-80
4.750	371	617	53.65	46.35	38-54
2.360	133	750	65.22	34.78	28-42
0.300	256	1006	87.48	12.52	7-21
0.075	87	1093	95.04	4.96	2-8
Pan	57				
Total	1150.0				

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Name of Work	:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	:	M/s Tejus Consultants
Contractor	:	Sri.Uday shetty
Date of Testing	:	06/12/16
Type of Mix	:	DBM
Sample ID	:	3

GRADATION FOR DBM
(As per MORT&H 500-10,Grading-2)

Sample Location: At plant

Date of Sampling:

Date of testing:

Type of material & Purpose: DBM

Oven Dry Wt.(gms): 1000.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
37.50	0	0	0.00	100.00	100.00
26.50	31	31	3.10	96.90	90-100
19.00	137	168	16.80	83.20	71-95
13.20	121	289	28.90	71.10	56-80
4.750	301	590	59.00	41.00	38-54
2.360	78	668	66.80	33.20	28-42
0.300	159	827	82.70	17.30	7-21
0.075	126	953	95.30	4.70	2-8
Pan	47				
Total	1000.0				

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BITUMEN CONTENT AND GRADATION DETERMINATION OF DENSE BITUMINOUS MACADAM MIX

Name of Work	:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	:	M/s Tejus Consultants
Contractor	:	Sri.Uday shetty
Date of Testing	:	07/12/16
Type of Mix	:	DBM
Sample I/D	:	1

DETERMINATION OF BITUMEN CONTENT

Description	Trail 1	Trail 2
1. Weight of Mixture before extraction, g	594	596
2. Weight of Mixture after extraction, g	569	569
3. Weight of Bitumen	25	27
4. Weight of filter paper before extraction, g	4	4
5. Weight of filter paper after extraction, g	6	6
6. Weight of fines, g	2	2
7. Weight of Bitumen & fines	27	29
8. Bitumen content in %	4.55	4.87
9. Average Bitumen content in %	4.71	

GRADATION FOR DBM AFTER EXTRACTION
(As per MORT&H 500-10,Grading-2)

Sample Location:	At site	Date of Sampling:	07/12/16
		Date of testing:	07/12/16
Type of material & Purpose:	DBM	Oven Dry Wt.(gms):	569.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
37.50	0.0	0.0	0.00	100.00	100.00
26.50	39.0	39.0	6.85	93.15	90-100
19.00	53.0	92.0	16.17	83.83	71-95
13.20	61.0	153.0	26.89	73.11	56-80
4.750	151.0	304.0	53.43	46.57	38-54
2.360	98.0	402.0	70.65	29.35	28-42
0.300	97.0	499.0	87.70	12.30	7-21
0.075	58.0	557.0	97.89	2.11	2-8
Pan	12.0				
Total	569.0				

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CONSULTANTS

BITUMEN CONTENT AND GRADATION DETERMINATION OF DENSE BITUMINOUS MACADAM MIX

Name of Work	:	Widening of Major Sandeep Unnikrishnan Road from Doddaballapura Road to Yelahanka Bus stand road towards BWSSB Water tank side in ward No.04
Client	:	BRUHAT BANGALORE MAHANAGARA PALIKE
Consultant	:	M/s Tejus Consultants
Contractor	:	Sri.Uday shetty
Date of Testing	:	07/12/16
Type of Mix	:	DBM
Sample I/D	:	2

DETERMINATION OF BITUMEN CONTENT

Description	Trail 1	Trail 2
1. Weight of Mixture before extraction, g	661	576
2. Weight of Mixture after extraction, g	632	550
3. Weight of Bitumen	29	26
4. Weight of filter paper before extraction, g	4	4
5. Weight of filter paper after extraction, g	5.3	5.10
6. Weight of fines, g	1.3	1.1
7. Weight of Bitumen & fines	30.3	27.1
8. Bitumen content in %	4.58	4.70
9. Average Bitumen content in %	4.64	

GRADATION FOR DBM AFTER EXTRACTION

(As per MORT&H 500-10,Grading-2)

Sample Location:	At site	Date of Sampling:	07/12/16
		Date of testing:	07/12/16
Type of material & Purpose:	DBM	Oven Dry Wt.(gms):	632.0

IS Sieve size in mm	Weight retained	Cummulative weight retained (gm)	Cummulative % of retained	Cummulative % of passing	Specification limits
37.50	0.0	0.0	0.00	100.00	100.00
26.50	26.0	26.0	4.11	95.89	90-100
19.00	42.0	68.0	10.76	89.24	71-95
13.20	95.0	163.0	25.79	74.21	56-80
4.750	141.0	304.0	48.10	51.90	38-54
2.360	130.0	434.0	68.67	31.33	28-42
0.300	121.0	555.0	87.82	12.18	7-21
0.075	60.0	615.0	97.31	2.69	2-8
Pan	17.0				
Total	632.0				